

# PATENT SPECIFICATION (11)

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## (54) A FILTER

(71) I, BILL PETER PHILIP NEDERMAN, of Swedish nationality, of Halalid 3, S-252 33 Helsingborg, Sweden, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a filter for separating solid particles from gases, comprising at least one intermediate layer of filter material having other layers of filter material disposed on each side thereof such that the or each intermediate layer divides the space between the two other layers disposed adjacent thereto into elongated passageways comprising inflow passageways on one side of the intermediate layer which are open at one end only so as to permit flow of gas into the filter and outflow passageways on the opposite side of the intermediate layer which are open at one end only so as to permit gas passing through the intermediate layer of filter material to leave the filter.

Filters for separating solid particles from gases, such as welding gases, are normally provided with a number of material layers engaging each other and designed to define together equally large passageways on both sides of the filtering portions via which the air to be cleaned is passed. A drawback of these prior constructions is that the filter after a relatively short time of use is plugged up because particles collected in the filter very soon obstruct the inflow passageways. Additionally, the prior constructions provide less good properties regarding durability against internal and/or external pressure loadings.

The present invention has for its object to eliminate these drawbacks and provide a filter with substantially prolonged service life and substantially increased ability to withstand internal and external pressure loadings. This is accomplished substantially by the fact that the intermediate filter material layer so divides the space between the two other layers of filter material dis-

posed adjacent thereto that the inflow passageways have substantially larger cross-sectional areas than the outflow passageways so as to form an inflow passageway system having substantially larger through-flow area than the outflow passageway system formed by the outflow passageways, whereby a quantity of solid particles separated from the gas may be stored without reducing its through-flow area below that of the outflow passageway system.

The invention will now be described more in detail with reference to the accompanying drawings, in which:—

Figure 1 illustrates a filter according to the invention in side view and partly in section;

Figure 2 illustrates a part of the filter; and

Figure 3 is a cross-section through three adjacent layers in the filter.

The filter illustrated in the drawings is adapted for use in separating solid particles from gases, preferably welding gases, whereby at least one intermediate filter material layer having filter material layers 2 and 3, preferably of the same material, disposed on each side thereof, defines elongated passageways 5 and 6 of which the inflow passageways 6 on one side of the intermediate layer are open in one end 10 so as to permit flow of gas into the filter while outflow passageways 5 on the opposite side of the intermediate layer are open in the other end 7 so as to permit gas passing through the intermediate filter material layer to leave the filter.

In order to give the filter a long service life, high particle separating capacity and, in addition, high durability against internal and external pressure loading, the intermediate filter material layer divides the space between the filter material layers 2 and 3 at both sides thereof into inflow passageways 6 having substantially larger cross-section areas than the outflow passageways 5 so as to form an inflow passageway system having substantially larger

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through-flow area than the outflow passageway system, whereby a quantity of solid particles separated from the gas may be stored within the inflow-passageway system without reducing its through-flow area be-  
5 stored within the inflow-passageway system

In order to utilize the space between the fibrous material layers in a particularly effective way as regards particle collection, and also to establish a durable filter element, the intermediate fibrous material layer 1 is designed to define inflow passageways 6 of a cross-sectional shape essentially different from that of the outflow passageways 5.  
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To form the intermediate fibrous material layer 1 to provide a large number of juxtaposed stiffening portions, said layer is so shaped as to form corners or apices 1a engaging one adjacent fibrous material layer 2, and arcuate portions 1b extending between each couple of adjacent apices and engaging the other adjacent fibrous material layer 3, each arcuate portion inter-  
15 connecting two apices defining with said first-mentioned adjacent fibrous material layer an inflow passageway 6.

From the points of view of stability and particle collection, particularly good results will be obtained if the inflow passageways 6 have a substantially triangular cross-sectional shape, although in certain cases, alternatively, a substantially square cross-sectional shape of the inflow passageway  
20 may be suitable.

In order, on one hand, to enable effective fixation of the intervening fibrous material layer 1 to one of the fibrous material layers 2, for instance with a binder, and, in addition, to define efficiently particle collecting pockets, the intervening filter material layer may include connecting portions 1c engaging connecting portions 2a of the adjacent filter material layer 2 so as to cause the connecting portions 1c, 2a of the respective layers to form with each other an angle of 45 to 90°, preferably 50 to 70°.  
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A stable and effective filter element will be provided in a particularly simple and cost-saving manner, if the layers 1, 2 and 3 are rigidly interconnected by means of adhesive strips 8 and 9 which close off the outflow passageways 5 at one side 7 of the filter element and the inflow passageways 6 at the opposite side 10 of the filter element.  
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The filter will be especially durable while maintaining a simple design if the filter material layers 1, 2, 3 are arranged to extend helically around a core 11 and, preferably, are surrounded by a casing 12, whereby the core and casing define walls of a filter compartment 13 having open end sides 14 and 15 for inflow of gas to the filter and outflow of gas from the filter.  
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Reference is made to my Application

No. 10700/77 (Serial No. 1,579,881) from which this application has been divided.

#### WHAT I CLAIM IS: —

1. A filter for separating solid particles from gases, comprising at least one intermediate layer of filter material having other layers of filter material disposed on each side thereof such that the or each intermediate layer divides the space between the two other layers disposed adjacent thereto into elongated passageways comprising inflow passageways on one side of the intermediate layer which are open at one end only so as to permit flow of gas into the filter and outflow passageways on the opposite side of the intermediate layer which are open at one end only so as to permit gas passing through the intermediate layer of filter material to leave the filter, wherein the inflow passageways have substantially larger cross-sectional areas than the outflow passageways so as to form an inflow passageway system having substantially larger through-flow area than the outflow passageway system formed by the outflow passageways, whereby a quantity of solid particles separated from the gas may be stored within the inflow passageway system without reducing its through-flow area below that of the outflow passageway system.  
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2. The filter as claimed in Claim 1, wherein the intermediate layer of filter material is designed to define inflow passageways of a cross-sectional shape essentially different from that of the outflow passageways.  
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3. A filter as claimed in Claim 1 or Claim 2, wherein said intermediate layer of filter material is so shaped as to form corners or apices engaging one adjacent filter material layer, and arcuate portions extending between each pair of adjacent corners or apices and engaging the other adjacent filter material layer, each arcuate portion interconnecting two corners or apices defining with said first-mentioned adjacent filter material layer an inflow passageway.  
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4. A filter as claimed in any one of Claims 1 to 3, wherein the filter material layers disposed adjacent to said intermediate filter material layer are arcuate such that the inflow passageways have an essentially circular cross-sectional shape.  
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5. A filter as claimed in Claim 1, wherein the intermediate filter material layer is designed such that the inflow passageways have an essentially square cross-sectional shape.  
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6. A filter as claimed in any one of Claims 1 to 5, wherein said intermediate filter material layer includes connecting portions engaging connecting portions of an adjacent filter material layer so as to cause the connecting portions of the re-  
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spective layers to form with each other an angle of 45-90°.

5 7. A filter as claimed in any one of Claims 1 to 6, wherein said layers form part of a filter element and are rigidly interconnected by means of adhesive strips which close off the outflow passageways at one side of the filter element and the inflow passageways at the opposite side of the filter element.

10 8. A filter as claimed in any one of Claims 1 to 7, wherein filter material layers

extend helically around a core and are surrounded by a casing such that the core and casing define walls of a filter compartment having open end sides for inflow of gas to the filter and outflow of gas from the filter. 15

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of  
the Original on a reduced scale

FIG. 1

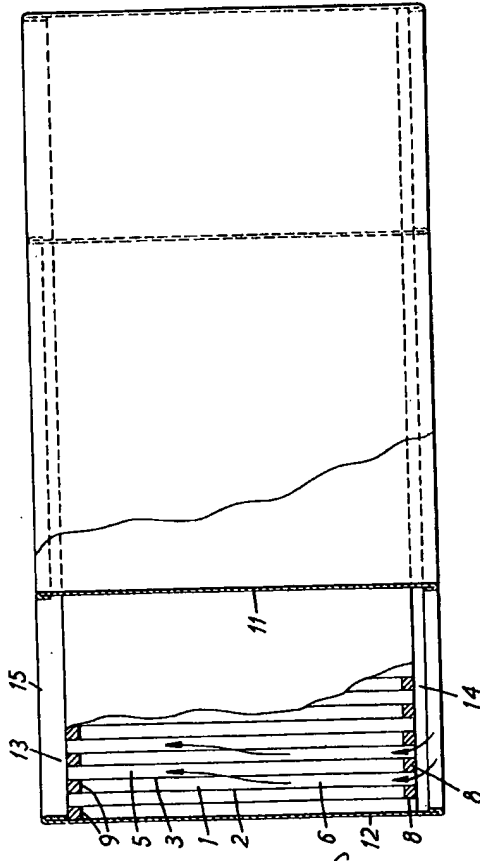


FIG. 2

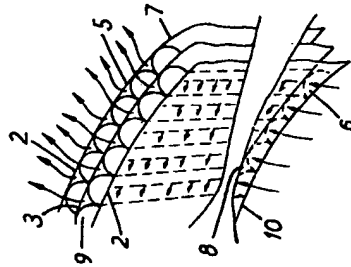


FIG. 3

